Technical Services
Special Commodities Branch
Office of Distribution

ANNATTO

General Description of Annatto

Annatto is an orange-red vegetable dye, occurring as the natural coloring matter of a layer of pulp surrounding the seeds of the annatto tree or shrub, Bixa orellana, a plant native to tropical areas of South America 1/ 2/ (1).

"Achiote," the Blood Tree of South American Indians

While the scarlet pulp surrounding the annatto seed provides a useful coloring matter for foodstuffs and other purposes, it is of even greater importance in tropical areas of South and Central America as a symbol of blood, emblem of life and power, and as such is used daily by native Indians for painting their bodies and in special ceremonies (2). Among the headhunters of the Amazon region, the achiote is considered a magical tree and like all plants which they cultivate is attributed with a "wakani" or soul. Since the magical achiote, called by these peoples the "ipiaku," is believed to have a female soul, it is the custom to entrust its care to the women of the tribes, who harvest the seeds and press them into small bamboo vessels which are given to both men and women to carry. A head-hunter would never be caught without this dye, for, to these Indians, danger lurks everywhere; the air, the rivers, are filled with evil genii who constantly seek to inflict harm, and the use of annatto dye is one means of combating this evil influence.

Painting the face with achiote, which is done by making large circles about the cheeks, s of combined religious and magical significance. Often the dye is mixed with the oil taken from the mysterious cave-dwelling nocturnal oil-bird 3/. Then the color is said to possess much power against the "evil-eye," and is a good augury for hunting. Formerly the Miskito women painted their menfolk before they embarked on a fishing expedition to hunt the great manatee, or before they left to enter the jungle in search of the wild pig. For this use, the annatto paste would first be thinned and tempered with strongly odorous vegetable oils; then decorative designs would be drawn upon the faces and bodies of the hunters with small sticks called "aulala-dusa." These drawings were done in an intricate series of dots, dashes, and geometrical designs. The hereditary enemies of the Miskito people, the Sumus, who live in the interior of the Mosquito Coast, adopt a different manner of painting but always use the achiote or

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1/ Numbers in parenthesis refer to literature cited at end of text.

2/ Other spellings of annatto are: anatta, anotto, annotto, arnato, arnato, onoto. In Central and South America, this plant is best known under the ancient Mexican name achiote adapted from the Aztec word achiotl. In Brazil, the dye is known as urucu or urucum, probably from the Tupu language of a lower Amazon tribe. The French name, corrupted from urucu is roucou. The Netherlands and Netherland's colonies know the plant as orleaans. In Scandinavian countries and certain other countries of northwestern Europe, the plant is known is orleans.

3/ Oil-bird, name for various birds yielding oil; guacharo, West Indies and South America, Steatornis caryensis; Frogmouth, Ceylon, Batrachostomus monsliger; Fulmar, Fulmarus glacialis.

General Description of Ayacabo

[illegible] is an [illegible]-red [illegible], centering at the [illegible] [illegible] [illegible] of a layer of [illegible] [illegible] [illegible] of the [illegible] [illegible] or [illegible]. Tica [illegible], a [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

"Ayacabo," the Mood Tree of South American Indians

[illegible] the [illegible] [illegible] [illegible] [illegible] [illegible]

annatto as a base. When the Sumas go to war with Miskito (Upla) people, the men paint themselves black on one side, red on the other, and in this ferocious aspect make war upon their enemies.

While annatto dye has been used for painting the body by all uncivilized and semi-civilized Indians from Mexico to Patagonia, no tribe has reached such a stage of decoration as have the Colorado Indians of western Ecuador. These curious, little-known Indians, living at the base of the western Andes in the province of Esmeraldas, now number only a few hundred as compared with several thousands before the conquest of the Incas by Spaniards. During one of the journeys, the conquerors discovered these Indians and named them the Colorados or "Red Ones." These Indians who are related to the Chibchas of Columbia, believe it is always necessary to dye their bodies red. Over the brilliant red, geometrical black lines are sometimes painted from the juice of the fruit genip, Genipa americana, a large fruit that yields a harmless black dye. Colorado Indian women dye only their faces, but theyalso use annatto for other purposes such as the dyeing of cloth. The Bicha Indians of Panama are said to have used the coloring of the annatto from time immemorail to decorate their bodies, partly for adornment but also to afford some relief from mosquitos and other insects. Caroline Islanders use annatto together with tumeric to paint their bodies and Samoans, also, use it in the same way (3).

In primitive reasoning, to be full of blood means to be alive; to be without blood means to be dead. To primitive people, blood possesses a vital being apart from the body and is thus both magical and mystical. The primitive natives of Australia use red ocher as the Colorado and other South American Indians use annatto, not only as a decoration but also as a means of protecting them against unseen forces, malignant principles, death and evil that dominate the whole organic and inorganic world.

Botanical Classification and Description

The annatto tree or shrub is a member of Bixaceae, a large monotypic genus of tropical trees (4). While the family Bixaceae consists of a single genus and species, several different varieties are known (5). The scientific name Bixa, according to Dr. David Fairchild, collaborator of the U. S. D. A., Division of Plant Exploration and Investigation, is derived from the name Bicha given to the plant by the Indians of Panama.

Of the known varieties, Bixa orellana which provides the bulk of the annatto of commerce, appears to be the most widely distributed. The specific name Bixa orellana, is reported to have been given in honor of Francisco Orellano,

the discoverer of the Amazon. These trees show a wide variation in height in the various regions of their distribution. The trees in Venezuela are described as being small. In the West Indies the average height is around 10 or 12 feet. In Panama, trees are reported to have attained a height of some 30 feet. Along the Gold Coast of Africa the tree is described as "a medium-sized, thick-growing shrub." British Indian trees are reported to average around 10 feet. In southern China and Kwantung the plant is described as only a shrub.

The tree has a flat-topped crown with a dense foliage of beautiful dark-green leaves (6)(Figure 1). The leaves are simple, entire, heart-shaped, tapering to a point and smooth without hair or down on either surface, but with prominant palmate venation. The petioles are long and thickened at both ends. At the base of each petiole, are 2 minute fungaceaceous stipules (7). On each side of the attachment of the leaf there are 3 to 10 tiny round, yellow or orange glands.

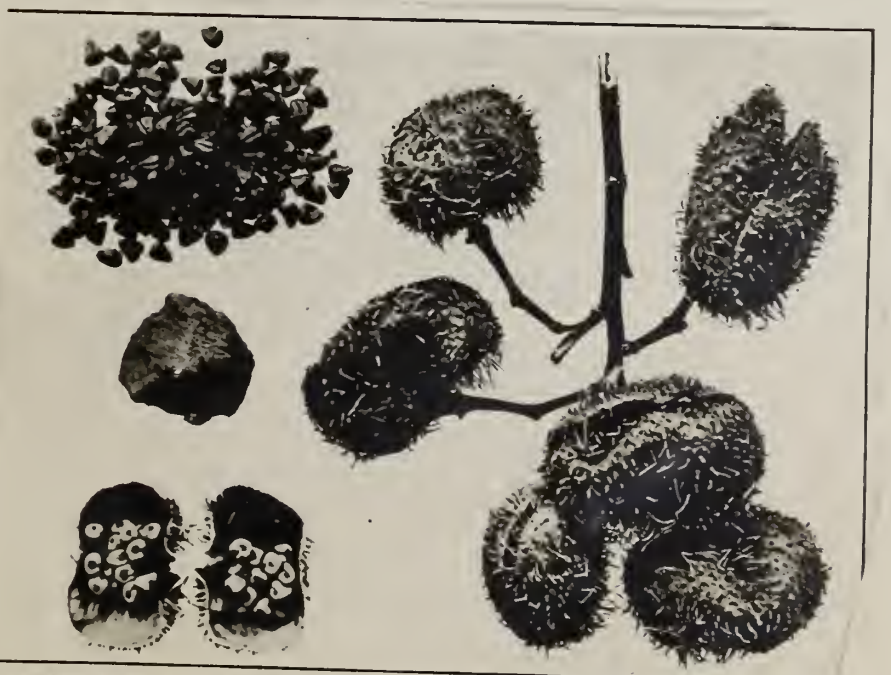
The large showy flowers vary in color from white to pink, rose and red or, in the Levine specimen, to lavender. The stamens are numerous, with long slender filaments. The anthers open by 2 terminal pores. The ovary is one-celled, and bears on the average about 40 anatropous ovules on the 2 parietal placentas. The slender, curved style has a slightly enlarged and weakly notched stigma.

The fruit is an ovoid, 2-valved capsule, from 1 to 1½ inches in length, usually densely clothed with long, slender, soft, prickles (Figure 2). The pods, green when young, turn brownish-mahoghany upon ripening. Usually about 8 months are required for the pods to mature. Upon ripening, the pods open up lengthwise through the middle, disclosing numerous small seeds attached to a central placenta. These seeds are quite small and angular resembling somewhat those of the grape in both size and shape. The soft sticky pulp surrounding the seeds contains the coloring matter which provides the annatto dye of commerce.

The brownish bark is marked with curved horizontal ridges just below the prominent leaf-scars. The inner bark contains a tough fiber from which twine is sometimes made. The twigs are usually scaly (8). The wood is pinkish yellow, very porous and soft and of little commercial value. In the early periods of history native Indians used the wood to generate fire by friction.

A small annatto tree, showing numerous pods

FIG. 1



Pods and seeds of the annatto (natural size) also a small lump of dried annatto pul

FIG. 2

The stems or branches contain a gum which is gathered by crushing the wood into a fine powder, shreds or fragments, and placing it in water until a substance similar to gum arabic separates out. The powdered root or root bark of annatto has been used extensively in Madras, India, as a mordant in dying cloth with the dye obtained from the root bark of Morinda tinctoria and other similar dyestuffs.

Climatic and Environmental Conditions

The annatto plant is a relatively quick-growing tree or shrub which may be grown in altitudes from sea-level up to 3,000 feet. While the tree grows wild in most of the tropical areas of Central and South America, best commercial results are obtained under cultivation. The trees may be propagated either from seeds or cuttings. Propagation from cuttings are generally advisable where reproduction of a special variety is desired. Seedling plants do not bear fruit as soon as those from cuttings and are said to flower less profusely.

The plant may be grown in almost any soil having sufficient moisture but a rich, loamy soil is the most favorable type. Fairly good yields have been reported on soils of which the fertility has been greatly depleted through coffee production. Very little cultivation or care is required to obtain satisfactory yields. For this reason, production of annatto is well adapted to most tropical countries where labor is scarce and inefficient. The principal care required is keeping down weed growth and removing old unfruitful trees. If thinning or removal of old trees are neglected, the trees are likely to crowd each other which results in lower yields.

In British colonies, where plants are grown from seed, the soil is prepared in much the same manner as for cotton. The seeds, previously softened by soaking in water, are planted in furrows at distances of 8 to 10 feet apart. The young seedlings should be provided with artificial shade to protect them from excessive heat, but later on a large amount of sunshine is necessary for their proper development. After about 3 months growth, the plantation should be weeded and superfluous plants removed by thinning. Propagation from cuttings may be made from branch cuttings from wood 6 months to one year old. A spacing of from 12 to 16 feet seems most desirable for Mexico and Central and South America. For Ceylon, a spacing of from 15 to 18 feet is recommended. The plant is not readily transplanted and it is generally desirable to seed or to place cuttings in their permanent location.

Production, Geographic Distribution

The early Spanish explorers probably transported Bixa orellana to southern Europe. As the plant became known, experimental work in adapting it to other areas was carried on in the colonies of the British Empire, France and the Netherlands. This has resulted in distributing production throughout practically all tropical areas of the world. The plant usually may be grown wherever oranges are grown.

Annatto has been produced commercially in Mexico, Venezuela, Ecuador, Brazil and French Guiana as well as in the Dominican Republic, Cuba, British and Netherlands West Indies and in the French Colony of Guadaloupe.

Additional sources of supplies include: British West Africa, British India, Ceylon and the British and Netherlands East Indies. Specimens have also been collected in Southern China and in Kwantung but no important commercial supplies have yet been available from these areas.

Official data of production of annatto are limited with only a few countries publishing any estimates of the annual output. The U. S. Department of Commerce, on the basis of trade advices has indicated an estimated normal commercial production of some 1,740 long tons or approximately 3,857,000 pounds. The following tabulation shows the distribution of this outturn by principal producing areas:

Table 1.--Annatto: Estimated normal commercial production, designated areas

Country	Quantity	
	Long Tons	Pounds
Ecuador	500	1,100,000
Jamaica	400	896,000
British India	500	1,100,000
Dominican Republic	100	224,000
All others	240	537,000
Total	1,740	3,857,000

Data: U. S. Department of Commerce from trade sources.

Country	Long Tons	Pounds
Country	500	1,100,000
Country	400	800,000
United States	900	1,800,000
Southern Rhodesia	100	200,000
All others	300	600,000
Total	2,200	4,400,000

Harvesting

Harvesting begins when the fruit capsules have ripened as indicated by their turning a reddish-brown color and just as the pods begin to break open. Usually about 8 months are required for the pods to develop and mature. Full crops of seed may be obtained in 3 to 4 years from the time of final planting but collections usually may commence after the first 18 months or even somewhat earlier. The pods break open along the edges beginning at the pointed end and thus exposing the bright-red-colored seeds. Cutting the branches along with the capsule is said to be advantageous in that it stimulates bearing and also prevents the plants from growing so high as to make collection difficult.

The capsules are opened out on mats or cloths and allowed to dry completely in the sun, being turned from time to time. Three or four days' exposure to sun and air is usually sufficient time to accomplish the necessary drying. The fruits are then collected into heaps and beaten with clubs or flails or threshed to separate the seeds from the pods. The empty pods are separated from the seeds by winnowing or sifting. The seeds are then again exposed to the sun until they are completely dry.

Preparation of Commercial Product

In some cases the seed is ground into annatto paste or dried with the crimson pulp attached in which case it is marketed as "annatto seed." Another method is to macerate the seeds with hot water until the whole pulp is washed off. The liquid containing the coloring matter in suspension is strained through a coarse sieve to remove the hard seed coats or seeds. In some processes the liquid is allowed to ferment for 10 to 14 days and in other instances it is processed without fermentation. In large-scale production, the pigment is allowed to settle in tanks. The insoluble red powder detached from the seeds settles to the bottom of the tank. It is then pressed into bricks or rolls and thoroughly dried when it is ready for shipment or for further processing for the extraction of the dye.

A simple process for preparing coloring matter from annatto seeds was reported by the Commissioner of Agriculture for the West Indies (9). This method consisted of washing the seeds in a dilute solution of ammonium hydroxide. The solution was strained off from the seeds and evaporated to a thick paste in steam-heated pans, when it yielded an annatto paste of greater brilliancy than that obtained by other processes. The simplicity of this process would permit it to be used in the regions of production while shipment of the concentrated paste rather than the bulky seeds would greatly reduce shipping space requirements.

Packaging for export varies somewhat in different countries. In the South American countries, the cake is dried and pressed into rolls or cakes, in which form it comes onto the market. The rolls of annatto paste from Brazil are usually small, rarely weighing more than 3 ounces. They are hard, dry, compact, brownish on the outside and of a beautiful red within. Annatto from the French colonies is largely marketed in the form of square cakes weighing from 2 to 3 pounds which are wrapped in banana leaves. Seeds were formerly packed for export in barrels although in more recent years British importers have recommended that they should be packed in double bags or sacks weighing from 1½ to 2 British hundredweight (112 pounds) each.

Grades and Chemical Analysis

There are no clearly defined grades of annatto on the markets but the conditions of the seed and the method by which they are dried are factors influencing the quality.

During the early years of international trade in this commodity the product was marketed principally in the form of paste. Many references still refer to annatto paste but such data as are available for more recent years suggest that most of the current international trade is in the form of the dried seeds or pulp.

Manufacturers in the United Kingdom, and merchants handling annatto paste, attributed the decline in the market for paste as being entirely due to adulteration in the producing areas. Samples of annatto are reported to have been found adulterated with ochre, brick dust, sand, chalk, salt, starch, gum, tumeric and other coloring matter (10).

French Guiana was for many years an important exporter of annatto paste known in the trade as Cayenne from the port of export. This paste was said to be superior in quality to the Spanish paste exported from Brazil and other Spanish American countries. These early shipments have been replaced with the dried pulp known as flag or cake annatto prepared under the more modern methods previously described. Annatto from Spanish American countries is commonly marketed in the form of seeds or of dried pulp in rolls. The French annatto is said to have a disagreeable odor but is of a bright red color containing on the average 10 to 12 percent of pure coloring matter and 5 percent ash. Spanish annatto is of a dull red color on the outside of the rolls or cakes but is bright red inside, has a sweet odor, a slightly disagreeable salty, bitter, flavor contains approximately 6 percent of pure coloring matter and from 5 to 10 percent ash.

Most authorities recognize two coloring pigments of annatto, Bixin, the more important of the two has been isolated from the annatto seed pulp and has been the subject of considerable research and investigation. Much of

the knowledge of the chemistry and physical properties of bixin has been due to the researches of Marchlewski (11). Bixin, a carotenoid pigment, is one of the coloring pigments of annatto. It is similar in constitution to lycopene, the pigment of tomatoes, and crocetin, present in saffron as crocin. Like lycopene and crocetin, it has no vitamin A activity. Euler and Euler were apparently the first investigators to study the physiological activity of bixin and reported it as being inactive (12). This has been confirmed by other studies including those of Cook and Axtmayer (13). Bixin is insoluble in water, only slightly soluble in alcohol but readily soluble in ether giving a brownish-yellow solution.

The second pigment known as orellin is less well known and is believed by some authorities to be an oxidation product of bixin. Orellin is of a yellow color and is technically of minor importance. It is soluble in water and alcohol but insoluble in ether.

Cook and Axtmayer in nutritional studies of foodstuffs in the Puerto Rican dietary found that if the crude red powder (annatto) obtained from the fresh seeds of Bixa orellana was extracted with cold 80 to 90 percent alcohol, a deep reddish-brown solution resulted which on evaporation left a dark-colored, sticky, resinous material (13). The preliminary report on the discovery of this activity showed this to be one of the richest vegetable sources of vitamin A activity.

These authors agreed with conclusions of other scientists that the colored salts formed by annatto extract do not carry vitamin potency, but they held that extraction of the seed by some type of organic solvent removed the vitamin A content. The same authors report unpublished work, that the annatto seed fed to chickens not only produces a deep color of the egg yolk, but also increases the vitamin A content of the egg. It was never claimed by these authors that the vitamin potency of the extract was necessarily due to carotene. Chromatographic adsorption analyses on the extract of the seed, however, indicate that there is some carotenoid. The ordinary commercial annatto coloring matter used for coloring oleomargarine, dairy and other food products consists principally of the bixin pigment which has no vitamin A activity.

Use of Annatto

Annatto has had many uses. The most important current use is as a dyestuff for certain food products particularly for butter, oleomargarine and cheese. Use in the United States is mainly restricted to coloring oleomargarine or the dairy products butter and cheese with a small percentage of available supplies used in coloring ice-cream, confectionery and other foodstuffs.

There are no definite data on consumption of annatto in the United States but according to information available in the U.S. Department of Commerce, it appears that the use pattern is approximately as follows:

	Percent
Cheese coloring	72
Butter coloring	23
Ice cream coloring and all other	5
Total	100

In Latin American countries annatto or "achiote" is commonly used as a coloring matter in many foods including chocolate and cocoa, rice, soups, meats etc. In Puerto Rico annatto is universally used as a coloring and flavoring for foods. The common practice in extracting the coloring is that of frying a few grams of the seed in lard until no further coloring matter is forthcoming. The seeds are then strained off and the colored fat is put away for future use. This colored fat is used in rice dishes, gravies, stews or in basting roast meats to make these dishes both attractive to the eye and pleasant to the taste.

In British India, experiments at Dehra Dun from seeds obtained from Orissa showed that annatto could be used satisfactorily for the coloring of Vansapati (hydrogenated oil) used as a substitute for "ghee" (liquid butter). Indian law requires that the Vanaspati be colored deep yellow in order to distinguish it from pure "ghee." For this compulsory coloring, synthetic dyes were recommended but their use was opposed on account of their possessing toxic properties. The quantity of annatto dye necessary for coloring was found to be approximately .37 percent of the weight of the fat or .17 percent of pure bixin. This quantity would be equivalent to .28 pounds of the dye to 80 pounds of fat.

Early uses of annatto in Europe and America consisted principally of its use as a dyestuff for textiles. Although early Spanish explorers brought the dye to Europe an English dyer, Bancroft, was granted a patent to import this material from the "New World" in 1775. Its use as a dye for textiles gradually gaveway to other pigments of more permanent nature and to synthetic dyes particularly the coal tar derivitives.

Little is known of the use of annatto in pharmaceuticals or therapeutics. The pulp has been recorded as a cordial, astringent and febrifuge 1/(14).

1/ Febrifuge, a remedy serving to mitigate or remove fever, antipyretic.

Percent

Cheese whiting	75
Rubber coloring	20
Zinc oxide coloring and all other	5
Total	100

It is supposed to have medicinal qualities and is employed as a purgative, taken internally, in tropical countries of South America. It is also believed to have been used as an antidote against the poison of cassava. Externally, it has been held to afford protection against mosquito bites. In certain South American countries it is also used as a remedy in cutaneous (skin) diseases and is applied on burns to prevent formation of scars. It is also used in salves and plasters. The leaves and roots are used in certain South American countries and Asia as a digestive tonic.

International Trade in Annatto

Data on international trade in annatto and annatto products are incomplete and for most countries not readily available. Influenced by the relatively minor importance both in volume and value of this commodity in world trade, it is frequently combined with other commodities in group classification rather THAN being reported separately. In addition, the war emergency has, in many instances, interrupted publication of statistical data and for this reason certain statistical series cannot be brought up to date. It seems desirable, however, to make available such data as may be compiled to be used as indicators of the relative significance of certain areas in world trade.

Analysis of available data and information indicate that the general direction of the world trade in this commodity is consistently from the tropical producing areas to the consuming areas of North America and northwestern Europe. In recent years some inter-American trade is reported among the South American countries and some re-export business from countries of North America and Northwestern Europe notably from the United States and Denmark to other areas.

The total accounted for international trade is approximately equal to the estimated commercial production of roughly 4,000,000 pounds. The leading importers of annatto and annatto products are the United States, and Denmark followed by the United Kingdom, France and Germany. The largest exporting countries are Ecuador, Jamaica, the Dominican Republic, and British India.

The United States is the world's largest importer of annatto and annatto extracts with United States imports representing approximately one-fourth of the total world trade. The following tabulations show the significant features of the United States import trade in annatto and annatto products:

Table 2.--United States: Imports of Annatto seed and annatto extract 1935-42

Year	Quantity	Value	Price per pounds 1/
	Pounds	Dollars	Dollars
1935	837,919	39,276	.047
1936	1,005,604	46,011	.046
1937	1,048,349	51,909	.050
1938	1,161,666	50,572	.044
1939	1,403,569	53,028	.038
1940	1,436,076	53,084	.037
1941	1,421,072	47,123	.033
1942	949,024	81,176	.086

Data of the United States Department of Commerce

1/ F.O.B. value at port of shipment

Table 7.--United States imports of Argentine bean and cowpea exports
1921-42

Year	Quantity	Value	Price per pounds 1/
	Pounds	Dollars	Dollars
1921	1,407,814	80,748	.057
1922	1,006,404	46,011	.046
1923	1,064,849	61,240	.058
1924	1,761,660	80,442	.046
1925	1,408,859	82,048	.058
1926	1,456,076	83,084	.057
1927	1,425,078	47,128	.033
1928	844,089	41,176	.049

Data of the United States Department of Commerce

1/ f. o. b. value at ports of shipment

Table 3.--United States: Imports of annatto seed and annatto extract, countries of origin 1935-42

Country of Origin	1935	1936	1937	1938	1939	1940	1941	1942
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Ecuador	334,905	446,633	449,892	680,046	807,024	788,698	680,032	76,000
Jamaica	327,702	310,699	314,154	255,155	419,479	467,628	566,931	618,974
British India	84,180	192,805	177,396	155,145	99,495	112,192	67,200	31,625
Dominican Republic	38,747	50,349	57,241	60,333	73,610	55,748	72,876	198,964
Brazil	47,579	--	45,162	--	--	--	--	--
Denmark	1,727	2,818	4,484	659	1,270	--	--	--
United Kingdom	--	--	--	--	2,100	--	--	--
All Other	--	--	--	--	591	11,810	32,033	23,461
Total	837,919	1,005,604	1,048,349	1,161,666	1,403,669	1,436,076	1,421,072	949,024

Date of the United States Department of Commerce

Table 5.--United States: Imports of annatto seed and annatto extract, countries of origin 1935-42

Country of Origin	1935	1936	1937	1938	1939	1940	1941	1942
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Ecuador	334,905	446,635	449,892	680,046	807,024	788,698	680,032	76,000
Jamaica	327,702	310,699	314,154	255,156	419,479	467,628	566,931	618,974
British India	84,180	192,805	177,396	155,145	99,496	112,192	67,200	31,625
Dominican Republic	38,747	50,349	57,241	60,333	73,610	55,748	72,976	198,964
Brazil	47,579	--	45,162	--	--	--	--	--
Denmark	1,727	2,813	4,484	659	1,270	--	--	--
United Kingdom	--	--	--	--	2,100	--	--	--
All Other	--	--	--	--	691	11,810	32,033	23,461
Total	837,919	1,005,604	1,048,349	1,161,666	1,403,669	1,436,076	1,421,072	949,024

Data of the United States Department of Commerce

No separate classification of re-exports of annatto and annatto products from the United States is available through official sources. Official statistics of annatto and annatto product imports into Canada, however, indicate that the bulk of Canadian requirements are normally received from the United States. It is also stated that the large modern Chinese butter and cheese factories and dairies obtain the bulk of their annatto coloring requirements from the United States (7).

Table 4.-- Canada: Imports, annatto, seed 1935-41

Year	Quantity			Value		
	U.S.	Jamaica	Total	U.S.	Jamaica	Total
	Pounds	Pounds	Pounds	Dollars	Dollars	Dollars
1935	31,191	--	31,191	1,924	--	1,924
1936	26,426	--	35,386	1,871	--	2,417
1937	41,519	8,960	50,479	3,130	565	3,695
1938	45,222	11,262	56,484	2,681	734	3,415
1939	34,047	2,240	36,287	2,044	84	2,128
1940	92,383	6,715	99,098	4,985	453	5,438
1941	19,447	--	19,447	1,187	--	1,187

Canadian Department of Trade and Commerce,
Dominion Bureau of Statistics, Trade of Canada, Annual Report

Table 5.--Canada: Imports, annatto, liquid or solid, 1935-1941

Year	Quantity			Value		
	U.S.	U. K.	Total	U.S.	U. K.	Total
	Pounds	Pounds	Pounds	Dollars	Dollars	Dollars
1935	20,405	775	21,803	5,939	637	6,701
1936	21,447	1,101	22,865	4,693	440	5,196
1937	20,214	292	20,506	4,377	84	4,461
1938 1/	9,013	400	9,730	1,734	169	1,954
1939	23,211	560	23,771	4,057	325	4,382
1940	19,753	830	20,583	3,243	292	3,535
1941	17,961	106	18,067	3,152	31	3,183

Canadian Department of Trade and Commerce, Dominion Bureau of Statistics,
Trade of Canada. Annual Report
Classified under chemicals and allied products, dyeing and tanning materials.
1/ During 1938, imports from Denmark amounted to 317 pounds valued at $51.

Table 6.--Canada: Imports, exports, and balance, fiscal 1938-41

Year	Quantity				Value			
	U.S.	Overseas	Total	U.K.	U.S.	Overseas	Total
	Pounds	Pounds	Pounds	Dollars	Dollars	Dollars	Dollars
1938	41,111	--	33,141	1,954	--	--	1,954
1939	38,414	--	46,384	1,971	--	--	3,417
1937	41,219	6,340	60,477	3,130	858	--	3,988
1938	45,302	11,342	86,454	3,161	734	--	3,415
1939	34,047	2,340	36,387	2,044	94	--	2,138
1940	82,389	6,715	96,089	4,389	458	--	4,847
1941	10,447	--	10,447	1,167	--	--	1,167

Canadian Department of Trade and Commerce.
Dominion Bureau of Statistics, Trade of Canada, Annual Report

Table 6.--Canada: Imports, exports, liquid or solid, 1938-1941

Year	Quantity				Value			
	U.S.	U.K.	Total	U.S.	U.K.	Total
	Pounds	Pounds	Pounds	Dollars	Dollars	Dollars
1938	30,408	778	31,408	5,239	837	6,701
1939	21,847	1,101	22,948	4,988	440	5,428
1937	20,234	386	20,620	4,377	84	4,461
1938 1/	2,013	400	2,750	1,734	178	1,958
1939	11,211	860	12,771	2,097	228	4,325
1940	18,778	850	20,283	3,248	590	3,838
1941	17,401	108	18,607	3,132	31	3,163

Canadian Department of Trade and Commerce, Dominion Bureau of Statistics,
Trade of Canada. Annual Report
Classified under chemicals and allied products, dyeing and tanning materials.
1/ During 1938, imports from Germany amounted to 317 pounds valued at $21.

Denmark apparently ranks next to the United States as an importer of annatto as a raw material. Statistics available for industrial production in Denmark indicate that sizable amounts of annatto are imported into Denmark for production of butter and cheese coloring, while export data show a fairly important export trade in the manufactured product. The principal features of the Danish foreign trade in annatto and annatto products and commercial production are shown as follows:

Table 6.--Denmark: Imports, annatto, by countries of origin, 1937,1939

Country	Years			
	1937		1939	
	Metric quintals	Pounds	Metric quintals	Pounds
Germany	--	--	28	6,173
United Kingdom	484	106,703	350	77,161
Netherlands	88	19,400	94	20,723
Other West Indies	273	60,186	843	185,848
Brazil	315	69,445	50	11,023
British India	909	200,398	550	121,253
Other South America	446	98,325	--	--
Total	2,515	554,456	1,915	422,180
Re-exports, Total	28.3			
Germany	27.3			

Danmarks Statistik, Statistik Tabelvaerk, Femte RAEKKE, Litra D. Nr. 60
(Danish Foreign Trade, Fifth Series, Class D No. 60)

Germany apparently trade used in the United States as an importer of
wastes as a raw material. Statistics available for industrial production
in Germany indicate that sizable amounts of wastes are imported into Germany
for production of butter and cheese solely, while exports data show a fairly
important export trade in the manufactured products. The principal features
of the German foreign trade in wastes and analogous products and commercial
practices are shown as follows:

Table 6.--Germany: Imports, exports, by countries of origin, 1937,1938

Country	1937		1938	
	Waste quantity	Waste value	Waste quantity	Waste value
Germany	--	--	29	6,173
United Kingdom	494	106,708	390	77,181
Netherlands	89	13,600	91	20,758
Other West Indies	273	60,146	442	165,848
Brazil	311	65,145	30	11,023
British India	909	200,394	880	181,288
Other South America	146	28,120	--	--
Total	2,012	504,458	1,918	452,100

Importers, Total 69.3
Germany 87.2

Table 7.--Denmark: Production of butter and cheese coloring, 1913,1930-38

Year	Quantity	
	Metric Tons	Pounds
1913	398	877,431
1930	303	667,994
1931	293	645,949
1932	283	623,902
1933	292	643,743
1934	316	696,654
1935	373	822,316
1936	509	1,122,141
1937	516	1,137,574
1938	489	1,078,049

Danmarks Statistik, Statistiske Meddelelser
4 REAKKE 109 Bind 4 HAEFTE 1938
Produktions statistik
Bianco Lunos Boglrykkeri A/S Kobenhaun

Table 8.--Denmark: Exports, butter and cheese coloring, (oplost Orleans - annatto). 1937, 1939

Country	1937	1939
	Pounds	Pounds
Germany	81,350	120,151
United Kingdom	83,334	106,262
Norway	36,376	63,272
Sweden	51,588	89,286
Finland	25,794	23,589
Esthonia	28,660	59,083
Latvia	14,550	27,337
Poland and Danzig	41,887	54,454
Belgium and Luxemburg	47,399	81,350
France	92,593	87,523
Union of South Africa	16,975	29,983
Total	634,925	827,827

Danmarks Statistik, Statistisk tabelvaerk, Femte RAEKKE, Litra D. Nr. 60
(Danish Foreign Trade, Fifth Series Class D No. 60)

Year	Quantity	
	[illegible]	[illegible]
1914	36	177,401
1920	240	647,234
1921	209	646,349
1922	240	455,124
1923	193	444,743
1924	316	605,004
1925	275	601,324
1926	509	1,122,142
1927	515	1,141,274
1928	459	1,041,249

Official import data of the United Kingdom and Germany do not show separate classifications for annatto or annatto products. Unofficial sources indicate that annual import requirements of the United Kingdom some years ago were around 75,000 to 100,000 pounds annually. No official import statistics are available for either Netherlands or Belgium but reports from the diplomatic service indicate that most of the Netherlands requirements are supplied from the Netherlands colonies. French statistics of prepared annatto for the years 1935-37 show the principal countries of origin of French imports and the approximate annual import requirements:

Table 9.-- France: Imports of prepared annatto, 1935-37 (Rocou préparé)

Country of Origin	Years		
	1935	1936	1937
	(Pounds. net)	(pounds net)	(Pounds. net)
Denmark	42,108	48,060	36,576
Netherlands	3,086	7,055	6,393
Guadaloupe	33,069	30,423	33,951
Other	3,527	5,512	3,748
Total	81,791	91,050	80,468

Republique Francaise, Direction Générale des Douanes Tableau Général du Commerce Exterieur, Imprimerce Nationale, Paris.

Table 10.--Jamaica: Exports, annatto 1931-41

Year	Quantity	Value	
	Pounds	£	U.S.Dollars
1931	699,495	7,488	33,958
1932	815,790	10,439	36,599
1933	675,107	6,813	28,865
1934	802,266	8,021	40,420
1935	913,659	9,295	45,562
1936	862,973	9,535	47,398
1937	916,007	12,470	61,652
1938			
1939	1,004,092	8,827	39,151
1940	635,662	7,441	28,499
1941	569,031	4,848	19,546

Barclay's Bank, The West Indies Year Book, Annual, 1931-1943

Country of origin	Import		
	1938	1939	1937
	(1,000 rels)	(1,000 rels)	(1,000 rels)
Germany	42,108	18,040	36,870
Netherlands	8,045	7,085	6,392
Czechoslovakia	33,046	30,425	31,851
Other	8,457	5,812	4,748
Total	91,656	71,060	80,461

Table 11.--Dominican Republic: Exports, annatto (Achiote) 1939-1942

Year	Quantity	Value	
	Kilograms	Pounds	U.S. Dollars
1939	38,976	85,926	3,271
1940	29,218	64,414	2,152
1941	36,621	80,735	2,504
1942	102,190	225,288	56,142

Compiled from Republica Dominicana, Anuario Estadistico, de la Republica Dominicana, Tome II.

Table 12.--Netherlands East Indies: Exports, annatto, 1935-40

Year	Quantity		Value	
	Kilograms	Pounds	Gulden	U.S. Dollars
1935	1,678	3,699	117	79
1936	7,008	15,450	444	286
1937	3,679	8,111	504	277
1938	10,805	23,821	2,116	1,164
1939	20,990	46,275	3,902	2,081
1940	9,663	21,303	2,064	1,096

Department van Ecpnomische Zaken, Mededeelingen van Het Centraal Kantoor voor de Statistiek, (No. 173) Jaaroverzicht van den in-en uitvoer van Nederlandsch Indie
(Department of Economic Affairs, Bulletin of the Central Bureau of Statistics)

Table 13.--Ecuador: Exports, annatto seed, 1940, 1941

Year	Quantity		Value	
	Kilograms	Pounds	Sucres	U.S. Dollars
1940	442,000	974,433	403,000	24,543
1941	310,000	683,426	279,000	18,601

Pan American Union, Annual Economic Survey of Latin America, 1941 Part II Vol. XI No. 7,8,9, p. 150

Table 17.--Dominican Republic: Exports, annual (Jan.-Dec.) 1939-1942

Year	Quantity		Value
	Kilograms	Pesos	U.S. Dollars
1939	52,376	41,...	4,271
1940	13,...	64,114	5,187
1941	34,...	81,...	8,804
1942	143,190	214,...	44,...

Compiled from Republica Dominicana, Anuario Estadistico, de la Republica Dominicana, Tomo II.

Table 18.--Dominican Republic: Exports, annual, 1939-40

Year	Quantity		Value
	Kilograms	Pounds	Dollars	U.S. Dollars
1934	1,672	3,686	317	79
1935	7,...	15,...	4...	236
1937	3,...	8,111	804	277
1938	10,...	24,...	2,...	1,...
1939	20,...	44,...	3,...	2,...
1940	9,...	21,...	1,...	1,...

(Superseded the Commercial Reports, Bulletin of the Central Bureau of Statistics)

Table 19.--Ecuador: Exports, country and, 1940, 1941

Year	Quantity		Value
	Kilograms	Pounds	U.S. Dollars
1940	445,...	974,...	45,...
1941	414,...	914,...	14,...

Sea Commerce Tables, Annual (Seconda Serie) of Lloyd's Register, 1941 Vol. II. Pp. 7,8,9, &, 120

Table 14.--Brazil: Exports, annatto seed, total and countries of destination, 1940, total 1941 (Urucum - annatto)

Year, country	Quantity		Value	
	Kilograms	Pounds	Cruziero	U.S. Dollars 1/
1940				
Argentina	9,520	20,988	47,209	2,497
Chile	1,000	2,205	1,674	89
United States	--	--	--	--
Netherlands	10,167	22,414	17,014	900
Portugal	20,650	44,202	31,014	1,641
Total	40,737	88,809	97,721	5,169
1941				
Total	21,080	46,473	26,451	1,410

Servico de Estadistica Economica e Financivia Commercio do Brazil Resumo por Mercadoreas No ano de 1940.
1941 Data from Commercial Counseler, Brazil.
1/ Weighted exchange rate used in foreign trade, 30 percent of exchange at official rate and 70 percent at free rate.

Table 15.--Venezuela: Exports, annatto, 1937-1942 (Bijao, onoto, achiote)

Year	Quantity		Value	
	Kilograms	Pounds	Bolivares	U.S. Dollars
1937	920	2,028	392	118
1938	310	683	295	91
1939	220	485	250	78
1940	310	683	183	57
1941	100	220	40	12
1942	1,418	3,126	1,282	3,856

Estados Unidos de Venezuela, Ministerio de Fomento, Estadistica Mercantil y Maritima, Lit y Tip Vargas

Table 12.--Brazil: Exports, annual, total and countries of destination, 1960, 1961, and 1962 (Pounds - amounts)

Year, country	Quantity	Value
	Kilograms	Cruzeiros	U.S. dollars 1/
1960			
Argentina	8,830	23,760	17,805	8,427
Chile	3,000	8,304	1,474	50
United States	--	--	--	--
Netherlands	31,127	21,614	17,064	706
Portugal	20,000	14,800	13,104	1,041
Total	60,757	80,000	67,751	6,149
1961				
Total	81,000	46,476	28,431	1,414

Servicio de Estadística Económica y Financiera, Comercio de Brasil Treinta Años de Intercambio Internacional, 1962.

1/ Valued using official rate and 70 percent of free rate.

Table 13.--Venezuela: Figures, annual, 1957-1962
(Tips, ounce, medium)

Year	Quantity		Value
	Tips	Ounces	U.S. dollars
1957	980	5,025	802	138
1958	340	665	359	93
1959	329	464	280	76
1960	210	299	145	47
1961	160	220	40	12
1962	1,421	8,160	1,324	3,260

Estados Unidos de Venezuela, Dirección de Estadística, Memoria, Navegación Internacional y Movimiento, 1957 y 1962 Tomos

Tariffs and Trade Regulations

The international trade in annatto and annatto products has been practically free from any restrictive tariff or trade regulations. Under the various United States Tariff Acts annatto and annatto extracts, not including alcohol, have been free of any tariff duties.

Under the reciprocal Trade Agreement with Ecuador of October 23, 1938, annatto and annatto products were bound on the free list. The Trade Agreement of January 1, 1939 between the United States and the United Kingdom extended the period for which imports of annatto and annatto extracts were bound free by a period of one year. The terms and conditions of these trade agreements became applicable to all countries subject to most-favored-tariff treatment. These stipulations remain unchanged during the emergency.

War Production Regulations - Import Quotas

The use of annatto and annatto extract in the United States during the emergency is limited by the War Production Board Conservation Order M-103 as amended July 27, 1944 to its use for coloring matter for food products.

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War Production Regulations - Import Quotas

The use of annatto and annatto extract in the United States during the emergency is limited by the War Production Board Conservation Order M-108 as amended July 27, 1944 to its use for coloring matter for food products.

Prices and Price Trends

Few statistical series of prices of annatto or annatto extract are available to indicate values in important producing or trading areas. Since the United States is the world's largest consumer of annatto and annatto extract, prices at New York may be considered as being generally representative of the market situation.

The following tabulations show quoted prices on annatto seeds and annatto paste at New York for a 10-year period 1935-44, years preceding and during World War II, as compared with similar data during the 1909-18, the years preceding and during the First World War. It will be noted that during the 5-year period immediately preceding the outbreak of hostilities in each war, prices fluctuated within relatively narrow limits. During World War II, prices have continued to be held at levels near those prevailing in the prewar years. This is in marked contrast with price movements during the First World War when sharp fluctuations in prices occurred.

Current Market Situation of Annatto in United States

The Department of Commerce has changed the import classification on annatto seed to accord with a decision of the Bureau of Customs that annatto seed was properly classified under group classification No. 2,320,240 which includes "crude articles not specifically provided for, for dyeing, coloring, or staining and entered under tariff paragraph 1670." This decision, therefore, has placed imports of annatto seed as one of the commodities included in this group classification which includes also other dyeing materials.

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Current Market Situation of Annatto in United States

The Department of Commerce has changed the import classification on annatto seed to accord with a decision of the Bureau of Customs that annatto seed was properly classified under group classification No. 2,250,240 which includes "crude articles not specifically provided for, for dyeing, coloring, or staining and entered under tariff paragraph 1670." This decision, therefore, has placed imports of annatto seed as one of the commodities included in this group classification which includes also other dyeing materials.

Table 17.--Annatto: Prices per pound, New York, seed, paste, 1909-19 1935-44. 1/

Seed				Paste			
Year	Price	Year	Price	Year	Price	Year	Price
	cents		cents		cents		cents
1909	8.5-11.0	1935	7.0-8.0	1909	32-35	1935	34-39
1910	8.5-9.5	1936	7.0-8.0	1910	32-35	1936	34-37
1911	7.0-7.5	1937	7.0-8.0	1911	32-35	1937	34-37
1912	7.0-7.5	1938	7.8-8.5	1912	32-35	1938	34-39
1913	7.0-7.5	1939	7.5-8.0	1913	32-35	1939	34-39
1914	7.0-7.0	1940	6.5-7.0	1914	32-35	1940	34-39
1915	10.0-14.0	1941	6.5-7.0	1915	40-60	1941	34-39
1916	8.0-8.5	1942	6.0-6.5	1916	40-60	1942	34-39
1917	15.0-16.0	1943	6.0-6.5	1917	45-60	1943	34-39
1918	13.5-14.5	1944	8.0	1918	33-35	1944	34-39
1919	8.5-11.0			1919	32-33		

Data from Oil, Paint and Drug Reporter.

1/ Price quotation nearest January 1 each year, in first hands, large lots f.o.b. New York.

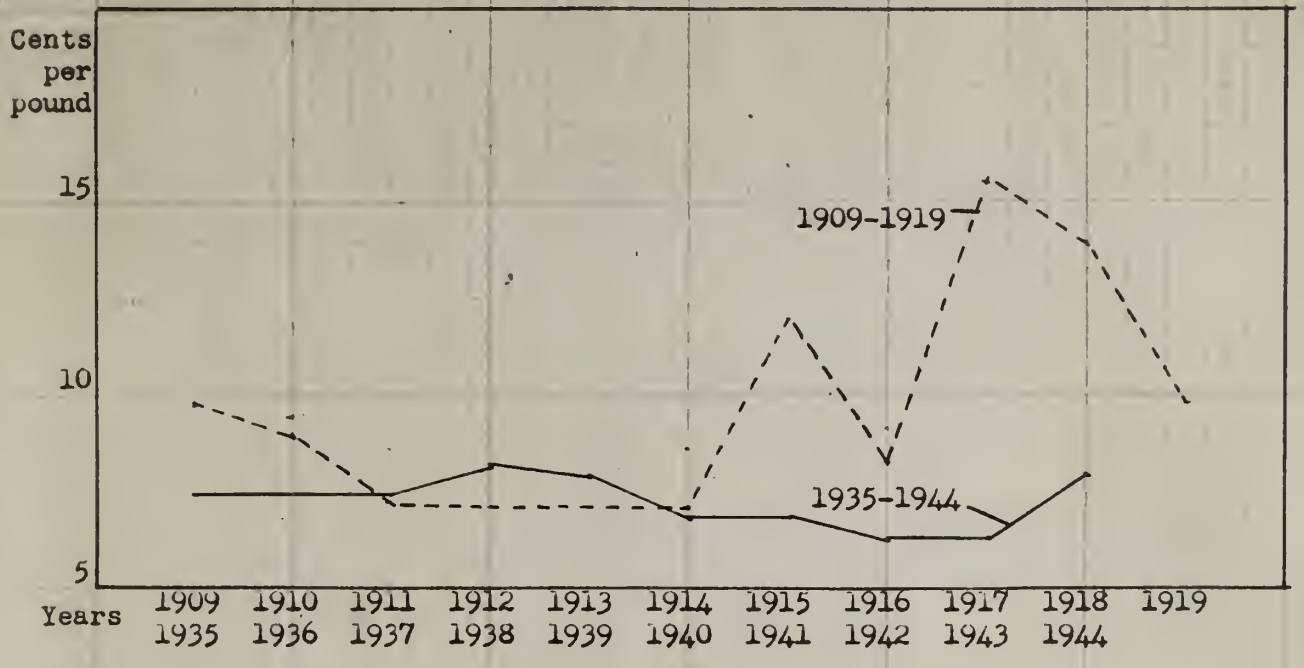
Table 17.--Insurance(2001 Interest Rate Basis, Male Lives, Level Premium Reserve 1/

1/ Figure supplied through courtesy of Actuary J. Owen Stalson, of Life Insurance Agency Management Association.

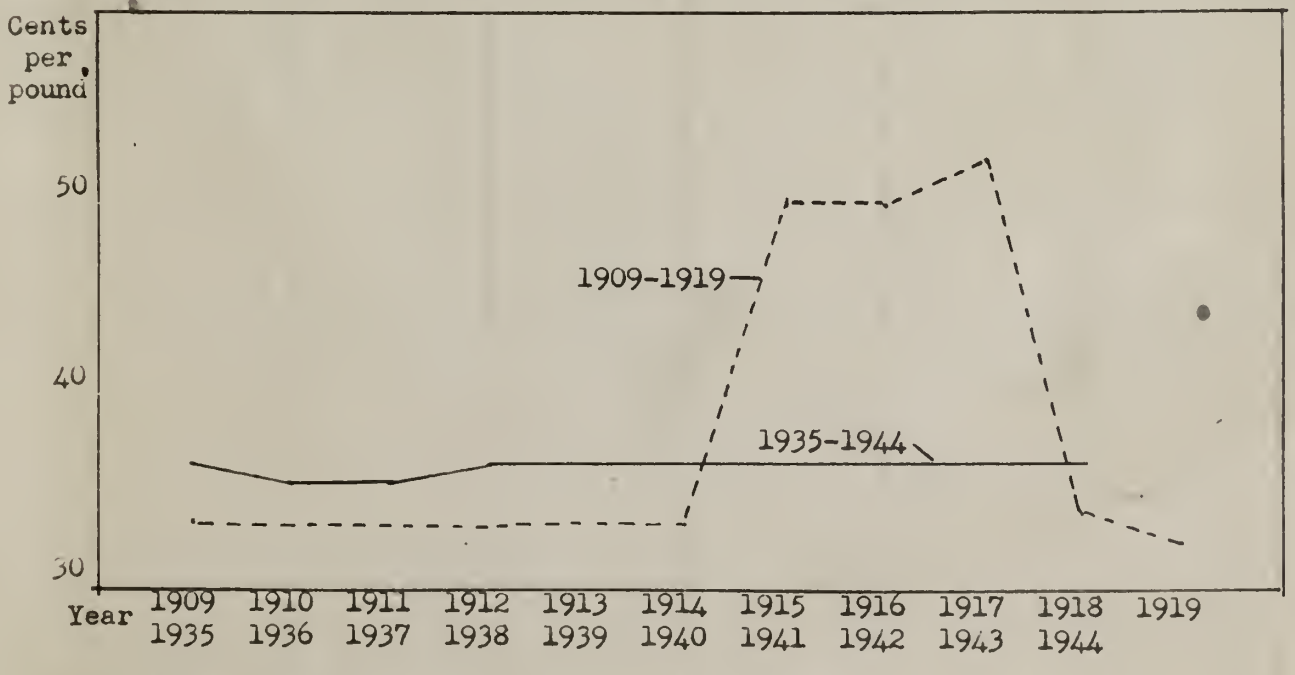
Source: Cole, Daniel and Irving Fetherman.

Chart 1.-

Annatto seed: Price per pound, New York, 1909-19, 1935-44 1/



Annatto paste: Price per pound, New York, 1909-19, 1935-44 1/



1/ Price quoted nearest January 1 of each year.

Georgia E. Cantrell
Technical Services
Special Commodities Branch
War Food Administration

The trade publication "Oil, Paint and Drug Reporter," however, has for several weeks past carried news comments attributed to reports from importers indicating that stocks of annatto have been on docks of Jamaica and other points of origin as long as three months awaiting available shipping space (15). It is noted that dealers and importers stocks are declared to be exhausted with the only material on hand in this country held by users and that although the present season is normally the period in which additional supplies are imported, none as yet is reported to have arrived this year, other than that previously noted, due to shortage of shipping space.

The Journal of Commerce, August 8, 1944 stated that "Spot supply is limited. A small lot recently arrived was delivered on outstanding contracts."

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Annatto Importers

W. M. Allison
162 Water Street
New York City

Export Finders Bureau
8 Bridge Street
New York City

S. B. Penick & Co.
50 Church Street
New York City

Ed. Long Chemical Co.
361 W. Superior Street
Chicago, Illinois

L. E. Ransom
279 Pearl Street
New York City

J. A. Manton Co.
10 Bridge Street
New York City

Dalton-Cooper Co.
11 W. 42nd Street
New York City

Archibald & Kendall
397 Washington Street
New York City

H. Kohnstamm & Co.
83 Park Place
New York City

Pablo Calvit & Co.
112 Wall Street
New York City

Gillespie & Co.
96 Wall Street
New York City

Volkart Bros.
60 Beaver Street
New York City

Stern, Stiner & Co.
44 Whitehall Street
New York City

D. Steengrafe
24 State Street
New York City

J. B. Long & Co.
818 N. Franklin Street
Chicago, Illinois

W. R. Grace & Co.
7 Hanover Square
New York City

Limestone Importers

H. W. Allison
[illegible] Street
New York City

Export Importers Bureau
8 Bridge Street
New York City

E. O. Denick & Co.
50 Church Street
New York City

Ed. Lang Chemical Co.
801 E. Eager or Street
Chicago, Illinois

L. S. Pearce
275 Third Street
New York City

C. A. Norton Co.
10 Bridge Street
New York City

Mallinckrodt Co.
11 N. 42nd Street
New York City

Archibald & Bendall
327 Washington Street
New York City

E. Bonnefoy & Co.
65 Park Place
New York City

Jacobs Daniel & Co.
114 Wall Street
New York City

Wolfgang & Co.
42 Wall Street
New York City

Wolbert Bros.
40 Beaver Street
New York City

Berry, Skinner & Co.
44 Whitehall Street
New York City

C. Tennyson
24 Hanover Street
New York City

A. M. King & Co.
818 N. Franklin Street
Chicago, Illinois

W. T. Grace & Co.
7 Thompson Square
New York City

Suppliers of Annatto

Chemical Mfg. Co.
52 Williams Street
New York City

Dalton & Cooper, Inc.
11 W. 42nd Street
New York 18, N. Y.

Diehl & Co.
334 W. 42nd Street
New York City

Eimer & Amend
635 Greenwich Street
New York City

Export Finders Bureau
8 Bridge Street
New York City

Fezandie & Sperrle
205 Fulton Street
New York City

Interstate Color Co., Inc.
5 Beekman Street
New York City

Kohnstamm & Co., Inc.
87 Park Pl.
New York City

Julian W. Lyon
95 Fulton Street
New York City

S. B. Penick & Co.
50 Church Street
New York City

J. Early Wood & Co., Inc.
220 Broadway
New York City

John Clarke & Co., Inc.
New York City

Mr. William E. Martin
New York City

D. Steengrafe, Inc.
New York City

Chemical Industries, Buyers Guidebook Number, 19th Annual Revision
Vol. 53, No. 5, October 1943, p. 43

G. E. Cantrell
Special Commodities Branch
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